DOCUMENT RESUME

ED 323 448 CG 022 770

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TITLE The Health Effects of Kava/Sakau and Betel Nut.
INSTITUTION Western Center for Drug-Free Schools and Communities.
PUB DATE Sep 90
CONTRACT SI88A80003
NOTE 18p.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Cancer; Cultural Differences; *Drug Abuse; *Drug Use; Foreign Countries; Tobacco
IDENTIFIERS *Betel Nut; *Kava Root; Pacific Islands

ABSTRACT

For generations Pacific Islanders have used kava root and betel nut for a variety of cultural, medicinal, and ceremonial purposes: to overcome social barriers and lubricate social interactions; to cure bodily afflictions; and to accompany traditional and religious rituals. Kava, also known as ava, sakau, and yaqona has a long tradition as a healing agent and ceremonial drug. Much contemporary kava drinking is done for the purpose of its pleasant physical effects. Kava has a very strong narcotic action, with the kava drinker experiencing an euphoric state for a short duration. Long-term physical symptoms of chronic drinkers include low body weight, liver and kidney problems, blood abnormalities, body rash, laziness, etc. Kava has been reputed to cure gonorrhea and to be helpful in curing other diseases. Tolerance of the effects of betel nut chewing is similar to nicotine. The most serious long term hazard associated with betel nut chewing is oral cancer. The chewing of the tough fibrous nut helps keep the teeth and mouth clean. The psychological effects of betel nut have been thought to be largely personal and/or social. The rising practice of using cigarettes with betel nuts is a major health concern for Micronesian nations. (ABL)

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ED 324 446

Western Center
DRUG-FREE SCHOOLS AND COMMUNITIES

THE HEALTH EFFECTS OF KAVA/SAKAU AND BETEL NUT

Harvey Lee

September, 1990

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Acknowledgements

The Western Center wishes to thank those participants in the 1990 Pacific Education Conference in Honolulu, Hawaii, who reviewed the materials in this monograph. Their comments and suggestions were invaluable in the final preparation of this report.

Special thanks are also extended to Lee Caudell for editorial assistance and to Marjorie Wolfe for help with formatting and design.

We would also like to take this opportunity to acknowledge and applaud the dedication shown by Prevention Coordinators and other educators in the Pacific who worked so tirelessly in the fight against drug abuse in the Region. In producing this document, we recognize that there are other substances besides illegal drugs which can be abused and which, in turn, may interfere with our children's education. These other substances, however, may be just as potentially damaging even though they are seldom reported as "headline" news.

Judith A. Johnson, Director
Western Center for Drug-Free Schools and Communities

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The Health Effects of Kava/Sakau and Betel Nut

Introduction

For generations, Pacific islanders have used kava root and betel nut for a variety of cultural, medicinal, and ceremonial purposes: to overcome social barriers and lubricate social interactions, to cure bodily afflictions, to accompany traditional and religious rituals.

The substances' historical roots are long and deep throughout the region and, in the case of betel nut, throughout many parts of the world. Accounts of the ritual use, ceremonial preparation, and curative powers of kava figured prominently in the diaries of Captain James Cook and other navigators as they recorded their Pacific explorations in the eighteenth century. The practice of betel nut chewing was first described by the Greek historian Herodotus in 340 B.C., and Father Carlo Salerio, a missionary in Melanesia nearly 130 years ago, described betel nut as the "coffee of their society."

But beyond the place of betel nut and kava in culture and healing, their intoxicating effects make them subject to abuse, and their users subject to addiction, with all its attendant psychological and physical manifestations. A number of serious health hazards have been associated with both substances, including oral cancer among betel nut users and even death among excessive kava users.

The purpose of this paper is to review the literature on kava and betel nut and to present evidence of documented health effects associated with their use.

The Health Effects of Kava/Sakau

Introduction

The kava root (also known as *ava, sakau,* and *yaqona)* has a long tradition in the Pacific islands as a healing agent and ceremonial drug. Explorers and traders who witnessed its use during the eighteenth century recorded a number of medicinal effects and ritual uses. But aside from its curative and cultural traditions, kava has long been used as a recreational drug. In recent years, kava has become an increasingly popular substance among island people seeking its pleasant physical effects. The root's widespread use in the Pacific raises questions about its possible benefits as weighed against its certain dangers, both short-term and long-term, for human health.

The Root and Its Origins

Kava, whose botanical name is *piper methysticum,* is known as *ava* in American Samoa, *sakau* in Micronesia, and *yaqona* in Fiji. The origins of the plant are unknown. Although in the past it has been found in Polynesia, Micronesia, parts of New Guinea, and the Philippines, it no longer grows in Tahiti or the Philippines (Steinmetz, 1960).

Piper methysticum belongs to the piperageae family of plants. It is a robust, somewhat succulent, erect perennial shrub with course, spare branches (Steinmetz, 1960). The plant grows on stony ground in cool, moist areas at altitudes of 1,000 feet above sea level. It requires direct sunlight and temperatures of 80 to 90 degrees. In addition to growing wild, the plant can be cultivated. In Fiji, five basic varieties are cultivated.

Active Ingredient

The root, scientifically known as *rhizoma piperis methystici* or *kava kava,* is the portion of the plant used to create the intoxicating kava drink that is the common form of consumption in the islands. The root contains several chemicals (Young, 1966; Schuckit, 1989). The most active ingredient is dihydorokawain, according to Van Veen and Hansel (1938; 1959). Traces of a sleep-inducing chemical, dihydromethysticin, are also present. The average kava root contains 3.3 grams of dihydrokawain and 4 grams of dihydromethysticin.

Method of Administration and Preparation

Islanders employ two basic methods of preparing kava for consumption (Steinmetz, 1960; Rossille, 1986; McGrath, 1973; Mathew, 1988; Lemert, 1967). The most traditional method is chewing. After the root has been cleaned and scraped, it is chewed by men, women, or children with strong jaws and good teeth, who exercise great care to avoid swallowing the juice (Steinmetz, 1960). Once a good "quid" (wad) is extracted in the mouth, the chewer spits the quid into a bowl and mixes it by hand with water or coconut milk, creating a yellowish foam-based drink. Very narrow strips of hibiscus bark are passed through the bowl to remove the foam. Then the liquid is strained through coconut husk, dried grass, or hibiscus bark. When the process is completed, the liquid is squeezed into cups and drunk. Traditionally, this style of preparation was used in ceremonial practices, and only adult males drank the kava.

A more modern--and more hygienic--method is pounding or grating. With this method, a flat or rounded rock is used to pulverize the root. Then the root is put into a bowl of water or coconut milk and stirred by hand for 5 to 10 minutes. (In ceremonial practice, a virgin is preferred to mix the root and water.) Once the stirring is completed, the mixture is strained through the fibers of hibiscus bark, which is squeezed until all the juices are extracted. Finally, water or coconut milk is added to the mixture. Unless the kava is to be drunk within a few hours, it is frozen for later use. Islanders drink kava from cups, half-shell coconut bowls, or carved wooden bowls. In the past, craftsmen would spend many hours carving elaborate kava bowls for royal families.

Kava drinking is no longer confined to old traditions and rituals. It has become a lucrative commercial venture in a number of islands. For instance, *sakau* bars are popular in the Micronesian island of Pohnpei, and kava bags--muslin bags similar to tea bags containing kava roots and stems--are produced in western Samoa. The *sakau*

bars freeze large amounts of the kava mixture in big tubs, and then thaw the kava in the evening and sell it for 25 cents a cup. There is no custom attached to drinking in the bars. Rather, the kava (*sakau)* is used as a substitute for alcohol because it is much less expensive. To use the muslin kava bag, the user simply soaks the bag for 2 minutes. One 2-ounce bag makes approximately 12 cups.

The taste and appearance of kava are not pleasant. It looks and tastes like muddy water, and sometimes has a very rough smell. Even the expert kava drinker shakes his or her head and makes a face before swallowing the drink (Steinmitz, 1960; Mathews, 1988). Because the liquid kava can cause a burning sensation when brought near the eyes, kava drinkers traditionally close their eyes before swallowing the mixture.

Although the kava drink is not pleasant looking, smelling, tasting, or easy to drink, foreigners as well as native people enjoy partaking of the kava ceremony. Roy Brunton describes the customary sunset drinking practice of the Tanna, an island tribe off of Vanuatu: "After men have drunk kava and eaten together they move away from each other as noise 'spoils the kava.' After some time they get up and make their way back to their hamlets or else retire to the men's hut to sleep." (*Island Business*, October 1989) In talking with kava drinkers from Pohnpei and Kosrae, I find very similar experiences to the one described above. In fact, sakau bars are dimly lit (usually with Christmas lights) and noise is kept to a minimum by the patrons. People seem to be sitting in a trancelike state after drinking a cup or two of kava.

'Kava drinking is no longer confined to old traditions and rituals. It has become a lucrative commercial venture in a number of islands.'

Physical Effects and Withdrawal

Kava has a very strong narcotic action. It will paralyze the sensory nerves, stimulate and then paralyze the muscles affecting the lower limbs. The mind stays alert and the mental faculties continue to work. The heart and lungs begin to work at a more rapid pace, but soon there is a change to a slower pace. These effects are similar to those of alcohol. The kava drinker experiences an euphoric state for a short duration. He or she is very quiet (talks softly), does not fight or become quarrelsome, and is very tranquil. The person's eyes are slow to react to light and pupils are enlarged. He or she has a hard time walking, and sleep is of the essence. (Steinmetz, 1960; Lernert, 1967; Mathews, 1988; *Island Business*, October 1989).

Tom Harrison, an articulate biologist and notable kava drinker reports: "The head is affected most pleasantly...you don't get drunk on kava. But it speeds up your slowness. You feel friendly, not beer sentimental, never cross. The world gains no new color or rose tint; it fits in its places and is one easily understandable whole. Talk, talk, talk, the world becomes a beauty of voices...you cannot hate with kava in you."

'Kava has a very strong narcotic action. It will paralyze the sensory nerves, stimulate and then paralyze the muscles affecting the lower limbs.'

Harmful Effects and Symptoms

A recent article pointing out the problems associated with drinking kava (*Island Business*, October 1989) reports three documented cases of deaths caused by the excessive drinking of kava in Vanuatu in the South Pacific. The Methodist Church of Fiji banned the drinking of kava because of students' falling grades during exams. In Western Australia, Fijian missionaries introduced kava to the Arnhem Land Aborigines in order to decrease distilled alcohol consumption. However, Western Australian officials later blocked the marketing of kava in the state because the Aborigines had taken to overconsumption of kava. A study by Malcolm Riley and John Mathews reports that up to 80 percent of the males and 20 percent of females were by that time considered heavy kava drinkers (Mathews, 1988).

The harmful effects to chronic kava drinkers are well documented in the literature. Steinmetz (1960) reports kava to be a spinal depressant (unlike alcohol, which is a cerebral depressant.) Some of the long-term physical symptoms are low body weight, liver and kidney problems, blood abnormalities, possible pulmonary hypertension, weakened eyesight, increased skin lesions, constipation, possible intestinal obstructions, bloodshot and irritated eyes, body rash, laziness, scaling/cracked skin, bad breath, shortness of breath, malnutrition, numbness, and dizziness (Steinmetz, 1960; Lemert, 1967; Rossille, 1986; Mathews, 1988). The extent of irreversible damage to organs in chronic kava drinkers is not known and is a major concern among many researchers, including the World

Health Organization.

The short-term physical symptoms include numbing of the mouth and tongue, mild sedation or sleepiness, and loss of appetite (Steinmetz, 1960; Lemert, 1967; Rossilie, 1986; Mathews, 1988).

There are a limited number of formal psychological/social studies on kava drinkers. However, on an anecdotal level, I have spoken with many native people throughout the region who report job loss, family breakups, and antisocial behavior linked to an overindulgence in kava (*Island Business*, October 1989; Mathews, 1988; Lemert, 1967).

Kava drinkers show no apparent physical withdrawal symptoms. What seems to be important is having a quiet, peaceful place to maintain the drug-induced sense of serenity. Senses (hearing, vision, and touch) are sharpened to the point that whispers are loud, dim lights are bright, and movement is exaggerated, according to psychologist Robert Gregory and psychiatrist John Cawte and oral reports by Pohnpeian kava drinkers. They also report an enhanced memory and a greater sense of inner-focus; however, data is limited, especially as to light, sound, and movement.

Health Benefits

Accounts of kava's curative powers can be found in the literature dating from the eighteenth and nineteenth centuries. In 1849, a physician named W. Hamilton wrote an account of the use of "*ava*" throughout the Pacific during the days of Captain James Cook's explorations in the mid-1700s. The account, "On the Ava Root of the Sandwich Islands," draws upon Cook's diaries to describe the root's effects on Hawaiian warriors during battle and on sailors during sickness. In another passage, Hamilton relates an incident described in Captain Beechey's narrative of the voyage of the *Blossom*, in which he quotes a ship's surgeon as follows:

> *A gentleman, a foreigner,...had undergone a course of it [ava] to remove a cutaneous affection, said to have been similar to St. Anthony's fire....He took two doses a day....About the second or third week the eyes became suffused with blood, and the cuticle around them began to scale, when the whole surface of the body assumed the appearance above described. The first dose is continued for a week or so, according to the disease, and then gradually left off. The skin clears at the same time, and the whole system is highly benefited.*

More recently, kava root has been used by European and American pharmaceutical companies, primarily in antiseptic remedies for chronic irritation of the genitourinary tract for gonorrhea, and catarrh of the urethra and bladder (Steinmetz, 1960).

Kava is also reputed to cure gonorrhea. It has been reported that in places where kava is taken regularly, gonorrhea is rare, whereas in Tahiti, where kava no longer grows, levels of gonorrhea are high. South Pacific island people report cases of gonorrhea or cystitis cured within a few days after drinking kava (Steinmetz, 1960).

Furthermore, kava has been found to be helpful in curing hypertension, bronchitis, diarrhoea, gout, rheumatism, nephritic colic, dropsy, colitis, metritis, salpingitis, enteritis, and nocturnal incontinence of urine (Steinmetz, 1960; Mathews, 1988). The potential use of kava as a medicinal remedy has not been thoroughly explored because of the discovery of penicillin and sulphonamides. Kava has the narcotic and antiseptic action to heal gynecological, urological, and other diseases, according to Steinmetz, who writes: "Kava certainly deserves to be tested clinically on a wide variety of diseases, seeing that the antibiotics and penicillin not infrequently cause considerable side-effects, and also because penicillin sometimes fails."

'The potential use of kava as a medicinal remedy has not been thoroughly explored because of the discovery of penicillin and sulphonamides.'

Social Implications

Kava drinking is attached to many ceremonial and ritual traditions throughout the Pacific. In his diaries, Captain James Cook wrote about the custom of kava drinking and its peculiar method of ceremonial preparation (Hamilton, 1849; Steinmetz, 1960). Captain Cook was so taken by the custom, in fact, that he took Swedish botonist Daniel Carl Solander and artist Sydney Parkinson along on his *Endeavor* voyage (1768 to 1771) to capture the essence of the newly discovered plant. On his second voyage (1772 to 1775), Cook took Johann Georg Foster and Foster's son to observe the kava custom. The Fosters' notes formed the basis of the first published accounts of the kava plant and ceremony.

Kava's various social and cultural roles include

national drink, token of goodwill, offering of respect, ceremonial drink, and religious ritual drink (Hamilton, 1849; Churchill, Steinmetz, 1960; Lemert, 1967; McGrath, 1973; Rossille, 1980; Mathews, 1988). It is also used in a Tongan courtship practice called *fai-kava* in which a group of boys, with the permission of the girls' parents, participate in a kava ceremony hosted by the young couple.

Future Considerations

Although the custom of kava drinking is a very important part of Pacific island culture, much contemporary kava drinking is done for the purpose of its pleasant physical effects. The drug's increasing recreational use raises a number of questions for future study and policy considerations. Mathews notes that research is needed in a number of areas: (1) to explore "the mechanisms by which kava use might cause macrocytosis of red cells, decreased platelet volumes, and decreased number of blood lymphocytes"; (2) "to discover whether the use of kava is a contributory cause of the sudden deaths which have occurred in small numbers of relatively young men from kava-using communities" in Arnhem Land; and, (3) "to discover more about the harmful effects of kava; to see whether these effects are reversed when the usage of kava ceases; to look for interactions among the effects of kava, malnutrition and alcohol; to devise ways to reduce the consumption of kava; and to search for other means by which the harmful effects of kava might be prevented" (Mathews, 1988).

'Although the custom of kava drinking is a very important part of Pacific Island culture, much contemporary kava drinking is done for the purpose of its pleasant physical effects.'

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The Health Effects of Betel Nut

Introduction

Betel nut is one of the most widely used mind-altering substances in the world. Only nicotine, alcohol, and caffeine are more prevalent. Estimates of the number of betel nut users range from one-tenth to one-quarter of the world's population (Krenger, Beran, 1988; Hill, 1952). Several sources estimate the number of users at nearly 200 million, including men, women, and children (Burton-Bradley 1966, 1972). Betel nut use has been reported in Africa, Asia, India, Sri Lanka, Southern China, Southeast Asia, and Indonesia, as well as the Pacific islands of the Philippines, New Guinea, and Micronesia.

Although some health benefits have been associated with its use, betel nut's role in oral cancer is well established in the literature (Atkinson, Chester, Smyth, and Tenseldam, 1964; Burton-Bradley, 1966; Martin, 1989). It also appears to be a "gateway drug" for youth, leading to more dangerous forms of drug use.

The Nut and Its Origins

The betel nut, whose scientific name is *areca catechu l.*, is a member of the palm family. It grows primarily on 10- to 15-foot trees in dense, tropical forests, although some Pacific islanders cultivate it as a decorative outdoor plant. The nut, which is about 2 inches long and 1 inch wide at maturity, comes in two shapes: oval or tapered on the ends. When very young, the nut is green; when mature, it is yellow. At least 17 varieties have been recorded in India (Bailey, 1930; Chang, 1964).

Active Ingredient

The active ingredient in the nut is the alkaloid arecoline, according to Drill (1965). In large doses, it depresses the central nervous system and paralyzes muscles as well as affecting the pupil with a slight paralysis and dilation (Blatter, 1926). Nine other alkaloids are also present, including choline, guvacine, and arecaidine (Willaman, 1961; Chang and DeVol, 1973).

Method of Administration and Preparation

The method of administration varies from region to region. In Micronesia, the Yapees and Palauans wrap the young betel nut in a leaf from the piper betel plant, add slaked lime (usually made from heated crushed coral or seashells), and begin chewing the nut toward the rear of the mouth. This creates a red juice that is spit out at first. Once the mixture is correct, the red juice is then swallowed by the user.

East New Guineans chew the nut with a leaf of the betel plant (a climber), and mineral lime (burnt coral) (Beran, 1988). Taiwanese betel nut chewers mix the nut with lime, gambir, and the fruit or underground stem of piper betel. Sometimes they add cinnamon, cloves, cardamon, or other spices (Chang and DeVol, 1973). Many cultures add even stronger stimulants to enhance the "kick" of the quid. For example, chewers in India and Ceylon add tobacco, and in Micronesia, more and more people (including children) are adding tobacco to the betel nut, leaf, and lime combination. Taiwanese chewers sometimes add even stronger stimulants, such as cocaine (Krenger).

'Many cultures add even stronger stimulants to enhance the "kick" of the quid.'

In Guam, the Chamorro chewers remove the husk from the mature betel nut, wrap the nut in a leaf from the piper betel plant, and begin chewing. At times, they suck on the nut and grind it down to bits and pieces in the back of their mouth. This process creates slightly less red juice in the mouth. Others chew the mature betel nut without a leaf; the nut is broken into pieces or sucked on for hours.

The chewing of betel nut, leaves, and lime increases the production of saliva in the chewer s mouth. Normally, the first two or three mouthfuls of saliva are spit out, leaving a reddish-brown stain on the ground. Once the mixture creates a nice balance to the palette, it is chewed for 20 to 30 minutes (Price and Gion, 1974; Chang and DeVol, 1973; Beran, 1988). Then, after the quid is tasteless, it is spit out to the ground leaving only the husk

(Chang and DeVol, 1973). Associated with the habit is a pleasant, minty mouth odor resulting from the chemical interaction between the nut and lime (Beran, 1988).

Physical Effects and Withdrawal

The effects on first-time chewers are very similar to the effects on first-time tobacco chewers or smokers. They experience nausea, light-headedness, and dizziness (Chang and DeVol, 1973). Tolerance to the effects of betel nut is very similar to tolerance to nicotine. It has been reported that after several times of use there are no effects to the body except for a burst of energy or a "pick-me-up" similar to that experienced by caffeine users.

The short-term effects include stimulation to the salivary, lacrimal, gastric, pancreatic, and intestinal glands. It also produces a reddening of the face and increases perspiration and breath rate (Krenger). There is a steady contraction of the muscles and constriction of the pupils (Blatter, 1926). Other short-term physical effects are the slowing down of the heart and the depression of the central nervous system (Chang and DeVol, 1973). Some of the physical effects are similar to the stimulating and euphoria-producing effects of caffeine.

Chronic betel nut chewers report withdrawal symptoms upon discontinuing the substance. The symptoms include dizziness, nausea, cold sweats, constricted throat, and sore tongue. The medical literature has referred to this as "betel nut psychosis." What occurs is an acute, reversible toxic psychosis affecting chronic betel nut chewers. Some of the symptoms are visual hallucinations or delusions after a brief period of abstinence.

'Chronic betel nut chewers report withdrawal symptoms upon discontinuing the substance.'

In my talks with betel nut chewers throughout Micronesia, every one of them has reported a mild-to-severe withdrawal period after discontinued use. The reported symptoms are very similar to those described in the medical literature. The uncomfortable feeling associated with betel nut withdrawal is the very reason for continued use by both children and adults (Chang and DeVol, 1973). In fact, several chewers have reported a strong craving for the substance after a few weeks of abstinence. This craving has led to relapse and return to the addictive habit.

Harmful Effects and Symptoms

The long-term effects are both physical and cosmetic. By far the most serious health hazard associated with betel nut is oral cancer. Study after study has linked mouth cancer to the chewing of betel nut (Atkinson, Chester, Smyth, and Ten Seldam, 1964; Burton-Bradley, 1966; Chang, 1964; Chang, 1966; Chin et al, 1970; Suri et al, 1971). This evidence has been found in Asia, India, and Micronesia. One of the logistical problems in researching whether betel nut causes mouth cancer is a lack of standardization in the amount of betel nut, lime, and leaf mixture used for each quid. It has been observed, however, that mouth cancer is more prevalent in countries with betel nut chewers than in those without.

Another long-term effect is the reddening of the teeth and gums. Many studies have found that chewing betel nut stains the teeth and deteriorates the gums (Hornung, 1972; Chang and DeVol, 1973; Wells, 1925; Krenger). Chang and DeVol report: "In the habitual chewer, the teeth become dark brown or almost black in color, and the lips and tongue and, to a lesser degree, the mucosa of the checks are colored reddish-brown. This is due to the tannic acid and catechin contained in the gambir, and the tannin contained in the betel nuts, which are strong dyes, staining the teeth and other parts of the oral cavity." However, there are no studies proving a correlation between the chewing of betel nut and loss of gum. It has been reported to weaken the mouth tissue, but no direct cause-and-effect correlation has been found (Chang and DeVol, 1973; Hornung, 1972).

'By far the most serious health hazard associated with betel nut is oral cancer.'

The long-term health effects of adding stimulants such as tobacco and cocaine have not been addressed extensively in the literature. The practice of adding tobacco to the betel nut mixture clearly holds potential health dangers, based on the mounting evidence of a link between smokeless tobacco and oral cancer. Although there is no conclusive evidence of the link between mouth cancer and tobacco/betel nut chewing, Pacific islanders should be increasingly concerned about the growing numbers of young children who are using betel nut. Because age restrictions have not been placed on the chewing of betel nut and tobacco, children have easy access to nicotine, a

clearly established "gateway" drug that leads to other forms of drug use and abuse.

Health Benefits

The chewing of the tough fibrous nut helps keep the teeth and mouth clean. It also releases alkaloids that increase the salivation in the mouth and provide a pleasant mouth odor.

Betel nut was thought to have medicinal purposes in several societies. It has been reported to prevent dental caries and to assist in expelling tape worms (Bailey, 1930). Others write that the betel nut was used as an aphrodisiac, as a digestive aid, and as a cure for halitosis (Aminuddin, 1971). Still others have reported a number of benefits such as toothache relief, antidepression, and relief of nausea and vomiting during pregnancy (Ponnampalam, 1968).

None of these remedies have been scientifically proven. One of the major myths is the prevention of dental caries. Many betel nut chewers hold this belief. However, it has been shown time after time that betel nut does not prevent caries (Well, 1925; Chang and DeVol, 1973; Hornung, 1972; Krenger). All the studies conclude there is more harm done to the gums and soft tissues than to the teeth themselves. Chang and DeVol, who specifically investigated the tooth condition of chewers, found no difference in the number of teeth or the condition of the teeth. In fact, an observation by Hornung (1972) in Guam found the same results as Chang and DeVol in Taiwan. However, Krenger cites several studies that discuss the negative effects on both teeth and gums.

'Betel nut was thought to have medicinal purposes in several societies.'

Although studies have documented many negative physical effects linked to betel nut chewing, a study conducted by Burton-Bradley (1966) to measure psychological effects found no support for claims of adverse psychological effects to the body. Following in the footsteps of Burton-Bradley (1966), Price and Gion attempted to measure selected behavioral variables on betel nut chewers. These behavioral variables included visual and auditory reaction time, symbol substitution, perceptual speed, digit span, and near/distance visual acuity. They found no significant difference, a finding that validated previous studies. They concluded that the psychological effects of betel nut may be largely personal and/or social (Price and Gion 1974; Krenger).

Social Implications

Betel nut chewing has many social implications that need to be considered and should not be discounted. Chewing of betel nut was first described by Herodotus in 340 B.C. (Hill, 1952). In many lands, betel nut chewing is deeply rooted in the culture. For example, in describing the Woodlark Island people 130 years ago, Father Carlo Salerio wrote: "Betel...is the coffee of their society, they use it at every moment. When they have it they find it an exquisiteness that they can hardly express and they are well pleased if they are to have their mouth reddened with a beautiful scarlet-red, with chest and the legs. It is very rare to find a Melanesian without his gourd and betel."

'Chewing of betel nut was first described by Herodotus in 340 B.C.'

In the past, betel nut served many social and cultural functions. It was a link between the rich and poor. It was used on ceremonial occasions such as births, marriages, and deaths. It was used as a gift from the wealthy and the poor alike. Malaysians used betel nut as a formal token of apology (Chang and DeVol, 1973). Palauans used it in courtship. In other countries it was used to suggest that one had overstayed his or her welcome (Aminuddin, 1971). Status has been connected with the passing of betel nut. Higher income groups offered betel nut at wedding ceremonies, Komplimento (Chamorro gift exchange), and at other special occasions. Yapees used it as a form of social greeting among strangers such as coffee is used in America.

Future Considerations

Although the traditional and cultural traditions associated with betel nut chewing cannot be ignored, they must be weighed against the health implications in future policy decisions about the substance. The high risk of oral cancer associated with the continued use of betel nut is of particular concern. In my travels throughout Micronesia, I have observed an increasing number of betel nut chewers (young and old) adding a clipped cigarette to their quid. Because there are no age limitations to chewing betel nut, the onset of use begins in child-

hood (Chang and DeVol 1973; Hornung, 1972; Beran, 1988). Throughout Micronesia, one can purchase a cigarette (one stick) at a low cost of 25 cents. One cigarette can be used with three quids of betel nut. The cigarette intensifies the stimulant effects of the betel nut for the chewer. This practice has been on the increase, according to Micronesians. This is a major health concern that will affect the Micronesian nations.

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